**Variables in Python – Basics**

**1. Variable**

A **variable** is a name that refers to a value stored in the computer’s memory.  
It acts as a container to store data that can be used and modified later.

Example:

x = 10

name = "Sowmya"

print(x, name)

**2. Types of Variables**

**a) Local Variables**

* Declared **inside** a function
* Accessible only **within** that function

def func():

x = 10 # local variable

print(x)

func()

**b) Global Variables**

* Declared **outside** all functions
* Accessible **throughout** the program

x = 20 # global variable

def func():

print(x)

func()

**c) Nonlocal Variables**

* Used in nested functions to access variables from the **outer function**

def outer():

x = "outer"

def inner():

nonlocal x

x = "inner"

inner()

print(x)

outer()

**3. Rules for Naming Variables**

* Can contain letters, digits, and underscores (\_)
* Must start with a letter or underscore
* Case-sensitive (name and Name are different)
* Cannot be a Python keyword (e.g., if, for)

**4. Assigning Values**

x = 10

y = "Hello"

a, b, c = 1, 2, 3

p = q = r = 100

**5. Data Types**

* **Numeric**: int, float, complex
* **Sequence**: list, tuple, range
* **Text**: str
* **Mapping**: dict
* **Set Types**: set, frozenset
* **Boolean**: bool
* **Binary**: bytes, bytearray, memoryview

**6. Constants -** By convention, constants are written in uppercase: PI = 3.14159

**Variables in Python – Advanced**

**1. Scope of Variables**

* **Local** – Inside a function.
* **Global** – Declared outside all functions.
* **Nonlocal** – Refers to a variable from an enclosing function.

x = 10 # Global

def func():

global x

x = 20

**2. Mutable vs Immutable**

* **Mutable**: Can be changed (list, dict, set)
* **Immutable**: Cannot be changed (int, float, str, tuple)

**3. Dynamic Typing -** Python variables can change type during runtime.

x = 10

x = "Hello"

**4. Type Casting**

a = int("5")

b = str(10)

c = float(3)

**5. Memory Management -** Python uses **reference counting** and **garbage collection** to manage memory.

**6. Naming Conventions**

* Variables: snake\_case
* Constants: UPPER\_CASE
* Private variables: \_leading\_underscore

**7. Deleting Variables**

x = 100

del x